A SHORTENED FORTY METRE DIPOLE

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This is not a new idea, but one which may be of interest because of its size and light weight. It can be used with a single mounting and also can be rotated, as it is at this QTH.

The idea of making this dipole came after the successful use of centre loaded whips for 3.5, 7.0, and 14.0 MHz whilst operating portable during caravan holidays over the past 5 or 6 years. The dipole is constructed using two of these whips mounted horizontally opposing each other and fed with coaxial cable through a 4:1 balun. The SWR is 1.2:1 or better over approximately 15 kHz.

The coils are the heart of any loaded antenna system and must have very low loss, but mechanical stability is also a factor. Several ideas were tried and this one has proved quite satisfactory.

The material is readily available from plumbers and aluminium suppliers.

The results have been compared with an inverted "V", an inverted G5RV and a loaded whip, and in all cases of VK4, VK6, P29 and ZL contacts, the loaded dipole was as good as or better than the others. One factor was noise, the three comparison antennas being 1 to 3 "S" points greater in noise level than the horizontal loaded dipole.

The total length of the dipole is 22 ft. 4 in. This may vary quite considerably if larger or smaller diameter tubing is used. The outer section is constructed so as to give a variation of 18 inches in length i.e. 3 ft. overall, which should cover all conditions of adjustment.

CONSTRUCTION DETAILS

LOADING COILS

Cut a 4½ in. length of 1⅞ in. PVC tube and cut out as shown in Fig 1 to serve as a skeleton coil former. Fig 2 shows the general arrangement of the antenna assembly.

Cut a length of 2⅜ in. PVC tube 5½ in. long for the coil casing and fit a disc each end made from a piece of ⅜ in. thick bakelite or fibre glass sheet. Remove these discs until later.

Cut a piece of 2 x 1¼ in. aluminium channel 1¾ in. long and drill and file a hole in each of the parallel sides to fit neatly over the 1 in. aluminium tube. Fit a U-bolt to hold the tube to the bracket, and fit this bracket to the fibre glass discs with 4 nuts and bolts (nuts outside). Drill and tap bracket to take solder lug for coil termination, duplicate this bracket for the ⅝ in. tube at the other end of coil and fit one end disc to the coil casing, securing it with PVC cement and 4 screws tapped in radially.

Next close wind 15 ft. of wire for the coil on the 1⅝ in. diameter tube, release tension and slip it off tube. Drill two holes 1/16 in. diameter each end of coil former for termination of winding, ease the winding on to the former and terminate one end leaving one inch of wire protruding. Stretch winding carefully to cover coil former from end to end of open section and terminate remaining end, once again leaving one inch protruding. The wire should be fairly tight on the former. Now space the winding with a piece of thin cord evenly over the whole of the former, fix wire with PVC cement and leave to set. Match-sticks can be used to keep turns evenly spaced whilst cement is setting.

Drill holes in the discs to take the coil ends, slide the coil inside the casing and fit remaining end disc with cement and screws as before. Solder a lug to each end of coil. A check with a GDO should show self-resonance at approximately 45 MHz. Duplicate for other coil and seal all holes with PVC cement.

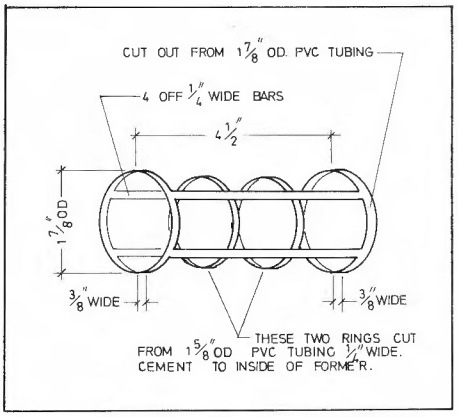

CUT OUT FROM 1⅞" OD. PVC TUBING
4 OFF ¼" WIDE BARS
4½"
1⅞" OD
⅜" WIDE
⅜" WIDE
THESE TWO RINGS CUT FROM 1⅝" OD PVC TUBING ¼" WIDE. CEMENT TO INSIDE OF FORMER.

FIG. 1

ELEMENT CONSTRUCTION

The telescopic section is next to be constructed.

If the ½ in., ⅜ in. and ¼ in. sections do not fit snugly into their mating sections, expand one end of each a little with a tapered tool to give a fairly tight sliding fit.

The lengths required for each section are (in inches):

Diameter	Length
1	36
⅝	36
½	24
⅜	21
¼	30

Overlap the 24 in. and 21 in. sections 3 in. into their mates and fit 3 self-tapping screws around tube at each end of overlap. Leave the ¼ in. outside section free until final adjustment, then fix likewise. Attach 1 in. and ⅝ in. sections to the coil and tighten U-bolts. Duplicate for other sections of dipole.

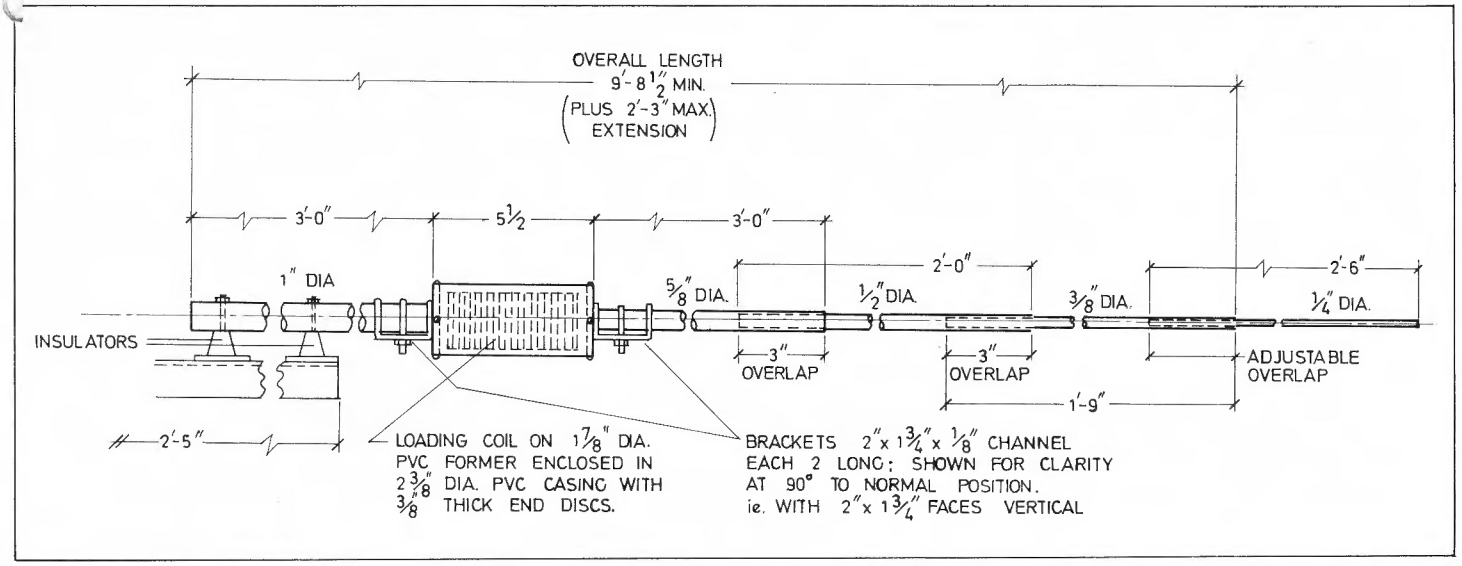


FIG. 2: Arrangement of each Half of Loaded 7 MHz Dipole.

TESTING

We now have two ¼ wave whips, so we can check each independently. If you have a metal roof, fix an insulator to hold one of the ¼ wave sections as a vertical and check resonance with a GDO. Adjust to about 7050 kHz, feed antenna with 50 ohm coaxial cable, check SWR and adjust for best SWR. Do the same for the other ¼ wave section at the same frequency. You will probably find a slight difference in the length of the two sections. Maintain this difference in the final configuration.

Next, mount the two half dipoles to the four stand-off insulators and attach to the remaining section of aluminium channel.

Mount the balun and connect the 4:1 ratio and reverse of normal, that is with the coaxial cable to the antenna terminals and the antenna to the coaxial terminals. This is because the antenna feed point impedance is in the order of 10-12 ohms.

Mount the antenna about five feet or so above the roof or part way up the mast and check resonance and SWR. Adjust for best SWR at 15-20 kHz higher than the frequency required, because the resonant frequency will drop slightly as the antenna is raised to the full height above ground.

Finally, fasten the ¼ in. sections of tube with self-tapping screws. Cover all telescopic joints with Araldite, tighten all screws and U-bolts and cover the screws and nuts also with Araldite.

Footnote: Suitable baluns are described in the ARRL Radio Amateur's Handbook 1971, page 350, or Electronics Australia, October 1965.

MATERIAL REQUIREMENTS

Aluminium Tubing: 1 in. OD 18 SWG 6 ft.; ⅝ in. OD 18 SWG 6 ft.; ½ in. OD 18 SWG 4 ft.; ⅜ in. OD 18 SWG 3 ft. 6 in.; ¼ in. OD 18 SWG 5 ft.

Aluminium channel 2 in. x 1¼ in. x ⅛ in. thick 3 ft.

White PVC Tubing 2⅜ in. OD ⅛ in. thick 1 ft.; 1⅞ in. OD ⅛ in. thick 1 ft.; 1⅝ in. OD ⅛ in. thick 0 ft. 6 in.

Insulators Stand-off 1 in, 4 off.

Bolts "U" 1 in. x 1½ in. long cad plated 2 off; ⅝ in. x 1½ in. long cad plated 2 off.

Fibre glass sheet 4¼ in. square x ⅜ in. thick.

Enamelled wire 16 SWG 30 feet (15 ft. each coil).

Bolts, nuts, fibre washers, PVC cement and Araldite. ■

TRY THIS

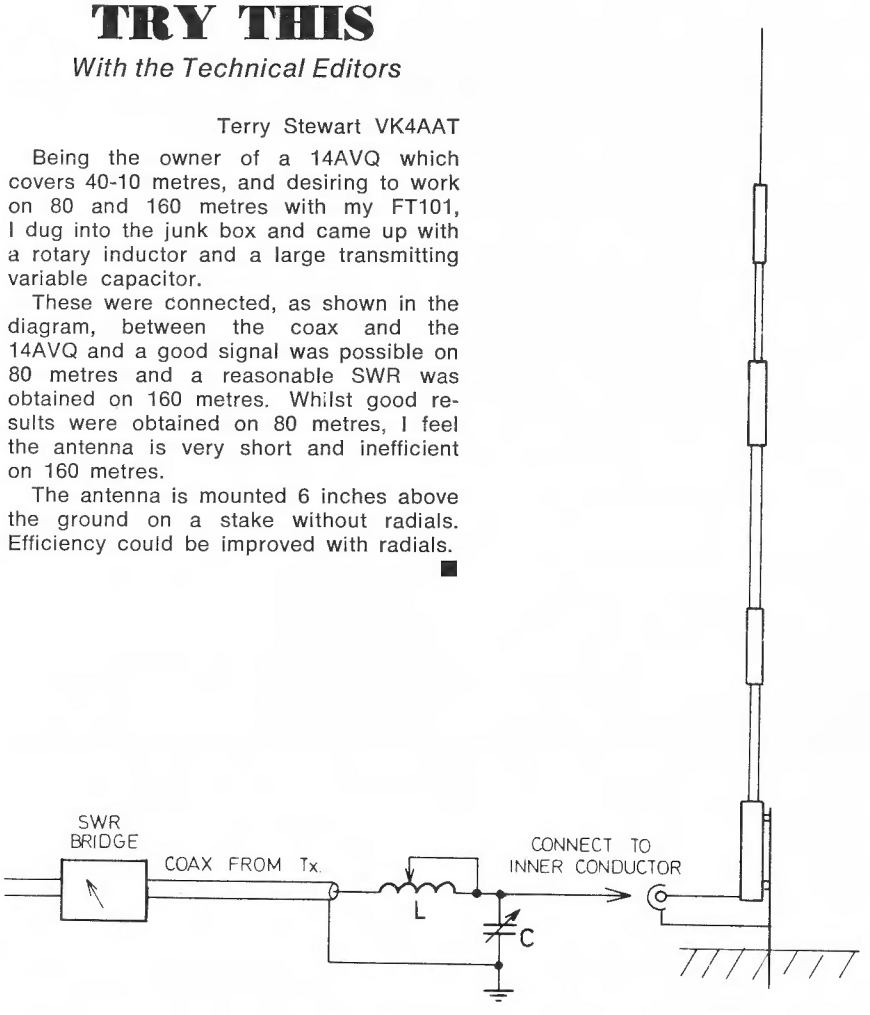
With the Technical Editors

Terry Stewart VK4AAT

Being the owner of a 14AVQ which covers 40-10 metres, and desiring to work on 80 and 160 metres with my FT101, I dug into the junk box and came up with a rotary inductor and a large transmitting variable capacitor.

These were connected, as shown in the diagram, between the coax and the 14AVQ and a good signal was possible on 80 metres and a reasonable SWR was obtained on 160 metres. Whilst good results were obtained on 80 metres, I feel the antenna is very short and inefficient on 160 metres.

The antenna is mounted 6 inches above the ground on a stake without radials. Efficiency could be improved with radials. ■



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